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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,147	03/14/2001	Toshiaki Kato	SQR-P1	5354
26793	7590	12/17/2004	EXAMINER	
LEIGHTON K. CHONG OSTRAGER CHONG & FLAHERTY (HAWAII) 841 BISHOP STREET, SUITE 1200 HONOLULU, HI 96813			ALI, SYED J	
			ART UNIT	PAPER NUMBER
			2127	

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/809,147

Applicant(s)

KATO, TOSHIAKI

Examiner

Syed J Ali

Art Unit

2127

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the amendment filed August 31, 2004. Claims 1-20 are presented for examination.
2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

Claim Objections

3. **Claims 2 and 13 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form.**
4. The limitations of claim 2 are encompassed by step (a) of claim 1, i.e. dividing a large processing task (master task grouping) into a plurality of task spaces that do not require passing of control from an external process. The limitations of claim 13 have similar deficiencies with respect to its parent claim 12.

Claim Rejections - 35 USC § 103

5. **Claims 1-3, 7-14, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rentschler et al. (USPN 5,821,950) (hereinafter Rentschler).**

Art Unit: 2127

6. As per claim 1, Rentschler teaches the invention as claimed, including a parallel processing method for performing processing tasks in parallel on a plurality of processors comprising:

(a) identifying at least one area of a large processing task directed to a plurality of computational processes that can be grouped together as a task space (col. 1 lines 37-40) not dependent on passing of control of processing from an external process in order to complete processing of the computational processes of the task space (col. 1 lines 40-52; col. 2 lines 19-24);

(b) breaking down the task space into a plurality of self-contained task objects each of which can be executed in one computational step without requiring passing of control to or from another object (col. 2 lines 25-30), wherein each task object is defined with a computational step (col. 4 lines 30-37) and at least one "data-waiting" slot for receipt of data requested from another task object to which the aforesaid task object passes a message for the requested data (col. 6 lines 42-47), and wherein once all the "data-waiting" slots of a task object are filled by the respective return messages, the task object can perform its defined computational step without waiting for any other input (col. 6 lines 58-64; col. 7 lines 3-6);

(c) scheduling the defined task objects of said identified task space to be processed by any of the plurality of processors, by:

(i) placing a task object with an unfilled "data-waiting" slot in a "waiting" state in which it is not assigned to any processor (col. 6 lines 17-23; col. 6 lines 38-47);

- (ii) changing the status of a task object to an “active” state when all of its defined “data-waiting” slots have been filled (col. 7 lines 3-9), wherein it is assigned to a next available processor in an “unoccupied” state, then placing that processor’s status in an “occupied” state (col. 8 lines 10-24); and
- (iii) changing the status of the task object to a “dead” state when the computational step to be performed for the task object by the assigned processor has been completed (col. 7 lines 5-6; col. 7 lines 55-60), and then changing the processor’s status to an “unoccupied” state to be assigned to a next “active” task object (col. 7 lines 5-6; col. 7 lines 32-38; col. 7 lines 55-60).

7. It is noted that Rentschler does not use the precise claimed terminology to refer to task or processor status, such as “data waiting”, “waiting”, “active”, “unoccupied”, “occupied”, and “dead”. However, the cited portions of Rentschler demonstrate similar functions, where the graphics processing is pipelined and divided into a staged process that performs processing on portions of the primitives before passing control to a subsequent portion. Separate processing boards are disclosed for geometrical calculations, texture mapping, and frame buffering. The pipelined process seeks to utilize parallel processing by having the geometry accelerators always processing data before forwarding the data to subsequent portions. Once the data being waited for is available, additional processing is performed and the previous section retrieves more data from the queue for additional calculations. Rentschler’s method of performing graphics calculations is substantially similar to the claimed invention.

Art Unit: 2127

8. As per claim 2, Rentschler teaches the invention as claimed, including a parallel processing method according to claim 1, wherein a master task grouping is defined by a plurality of task spaces (col. 1 lines 37-40) each of which contains multiple task objects and does not require passing of control from an external source in order to complete computation for the respective task space (col. 1 lines 40-52; col. 2 lines 19-24).

9. As per claim 3, Rentschler teaches the invention as claimed, including a parallel processing method according to claim 2, wherein all task objects of the task spaces which are in an "active" state are placed in a processing queue and each is assigned in turn to a next available "unoccupied" processor (col. 6 lines 17-23; col. 8 lines 10-24).

10. As per claim 7, Rentschler teaches the invention as claimed, including a parallel processing method according to claim 1, wherein an identified task in computer graphics rendering includes shading an image frame of a scene (col. 6 lines 48-56).

11. As per claim 8, Rentschler teaches the invention as claimed, including a parallel processing method according to claim 7, wherein the shading task includes a master task grouping of shading task spaces each of which performs shading of a pixel in the image frame (col. 6 lines 48-56).

Art Unit: 2127

12. As per claim 9, Rentschler teaches the invention as claimed, including a parallel processing method according to claim 8, wherein each shading task space includes a plurality of “pixel shading” task objects for performing shading of the pixel based upon ray shooting from light sources in the scene (col. 4 lines 30-37; col. 6 lines 38-47), and a “compositing” task object for compositing the shading results for the pixel (col. 4 lines 46-54).

13. As per claim 10, Rentschler teaches the invention as claimed, including a parallel processing method according to claim 9, wherein each shading task object has at least one “data-waiting” slot for return of data characterizing light emitted from a respective light source in the scene (col. 6 lines 38-56).

14. As per claim 11, Rentschler teaches the invention as claimed, including a parallel processing method according to claim 9, wherein the rendering task includes a function for receiving scene data for a “world map” of the scene (col. 4 lines 55-65), a function for defining the scene objects in each frame of the scene (col. 6 lines 48-56), a function for defining the pixels of an object in the scene intersected by an eye ray of a viewer of the scene (col. 6 lines 48-56), and a function for tiling together the shading results returned by each of the master shading task groupings for respective objects in the image frame (col. 4 lines 46-54).

15. As per claims 12-14 and 19-20, Rentschler teaches the invention as claimed, including a software programming method for performing processing tasks in parallel on a plurality of processors comprising the method steps of claims 1-3 and 7-8, respectively (col. 1 lines 23-26).

16. As per claim 18, Rentschler teaches the invention as claimed, including a software programming method according to claim 12, further comprising storing templates for different types of task engines, spaces, and objects in a library and utilizing the templates to generate software programming for a desired processing task (col. 6 lines 48-56).

17. Claims 4-6 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rentschler in view of Brobst et al. (USPN 6,125,382) (hereinafter Brobst).

18. As per claim 4, Brobst teaches the invention as claimed, including a parallel processing method according to claim 3, wherein a master engine for the master task grouping maintains threads which track the processing of task objects in each of the task spaces (col. 5 lines 40-56).

19. It would have been obvious to one of ordinary skill in the art to combine Rentschler and Brobst since threads of control allow a process to be encapsulated within special data structures that are easily scheduled. Within parallel processing systems, threads of control may allow multiple tasks execute concurrently on the same processor. Many thread scheduling algorithms are well known that are capable of handling data dependencies such that threads do not become blocked or starved, thereby allowing the system to maximize the available processing resources.

20. As per claim 5, Brobst teaches the invention as claimed, including a parallel processing method according to claim 4, wherein the master engine for the master task grouping maintains an internal space address assigned to each respective task object (col. 5 lines 40-56).

21. As per claim 6, Brobst teaches the invention as claimed, including a parallel processing method according to claim 5, wherein a task object in one master task grouping can exchange data with a task object in another master task grouping by providing its internal space address indexed to its master task grouping (col. 1 lines 36-46; col. 5 lines 40-56).

22. As per claims 15-17, Rentschler teaches the invention as claimed, including a software programming method for performing processing tasks in parallel on a plurality of processors comprising the method steps of claims 4-6, respectively (col. 1 lines 23-26).

Response to Arguments

23. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new grounds of rejection.

Conclusion

24. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

Art Unit: 2127

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Syed Ali
December 10, 2004



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